

Name: _____ Date: _____

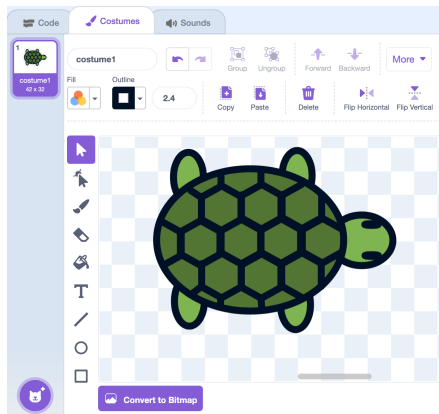
Use these instructions for assignments: **Scratch: L-sys Turtle pic 1 (page 3)**
and Scratch: L-sys Turtle pic 2 (page 4)

L-system Turtle Graphics

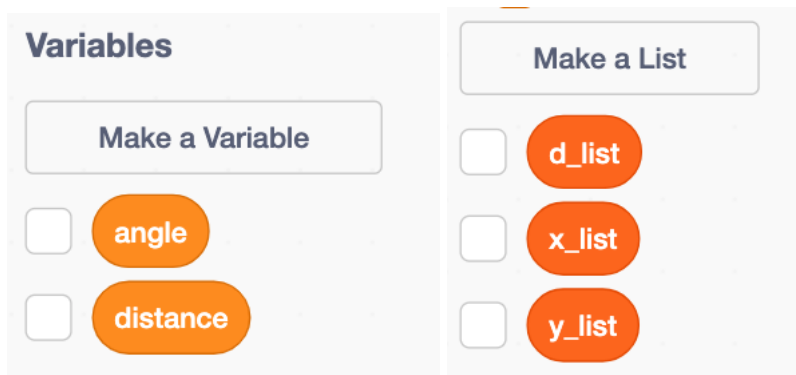
- In Scratch, we wish to create the following:
 1. A turtle sprite (from bird's-eye view)
 2. Use keyboard buttons to control the turtle using the following moves:
 - W = Move forward
 - D = Turn right
 - A = Turn left
 - S = Hop forward (and do not draw)
 - E = Save position at top of list
 - Q = Return to top-of-list position and delete position from list

Start a new project

1. Go to <https://scratch.mit.edu>
 - Login to save your work.
 - Create a new project.
2. Click on **Costumes** to edit the cat.
 - Delete the 2nd costume.
 - Change the 1st costume to look like the following turtle:

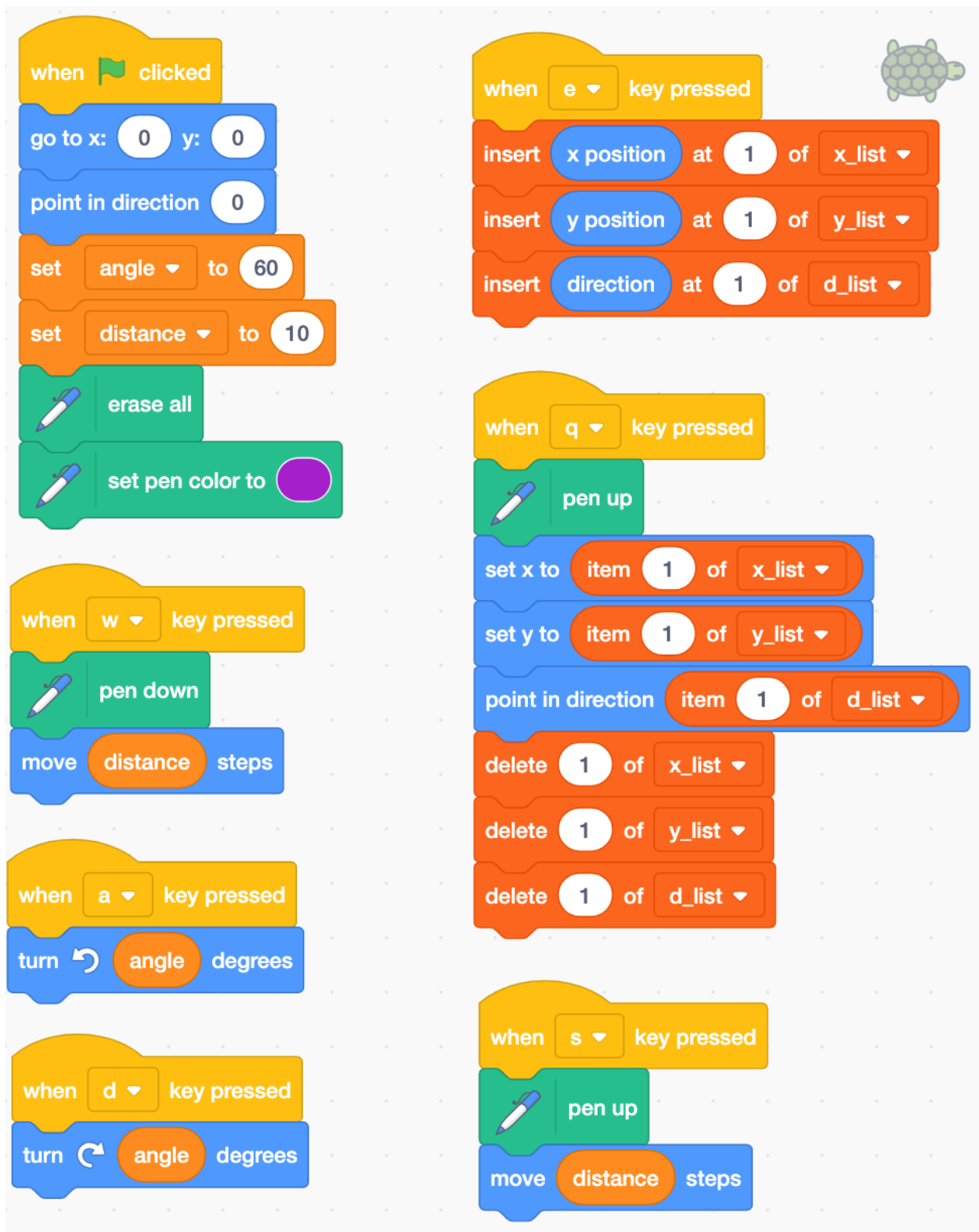


3. Make the following variables and lists:



4. Add the Pen extension! (Purple button in bottom right).

5. Write the code:



The code is organized into two columns of Scratch blocks. The left column contains four event-driven blocks: 'when clicked', 'when w key pressed', 'when a key pressed', and 'when d key pressed'. The right column contains three event-driven blocks: 'when e key pressed', 'when q key pressed', and 'when s key pressed'. A small turtle icon is visible in the top right corner of the workspace.

Left Column:

- when clicked
 - go to x: 0 y: 0
 - point in direction 0
 - set angle to 60
 - set distance to 10
 - erase all
 - set pen color to purple
- when w key pressed
 - pen down
 - move distance steps
- when a key pressed
 - turn angle degrees
- when d key pressed
 - turn angle degrees

Right Column:

- when e key pressed
 - insert x position at 1 of x_list
 - insert y position at 1 of y_list
 - insert direction at 1 of d_list
- when q key pressed
 - pen up
 - set x to item 1 of x_list
 - set y to item 1 of y_list
 - point in direction item 1 of d_list
 - delete 1 of x_list
 - delete 1 of y_list
 - delete 1 of d_list
- when s key pressed
 - pen up
 - move distance steps

6. Make the turtle sized small (just big enough to see it is a turtle in fullscreen mode).

7. Make a drawing!

- Go to fullscreen mode.
- Click the green flag to Go.
- Type the following keys on your keyboard:

EWEA WSWQ EDWS WQWE AWEA WSWQ EDWS WQWS SWEA WSWQ
EDWS WQWQ EDWE AWSW QEDW SWQW SSWE AWSW QEDW SWQW
QWEA WSWQ EDWS WQWQ EDDW EAWS WQED WSWQ WEAW EAWS
WQED WSWQ WSSW EAWS WQED WSWQ WQED WEAW SWQE DWSW
QWSS WEAW SWQE DWSW QWQW EAWS WQED WSWQ WQEA AWEA
WSWQ EDWS WQWE AWEA WSWQ EDWS WQWS SWEA WSWQ EDWS
WQWQ EDWE AWSW QEDW SWQW SSWE AWSW QEDW SWQW QWEA
WSWQ EDWS WQWQ SSSS SSSS SSSS

8. **Submit** a screenshot of the drawing **on Canvas** under assignment **Scratch: L-sys Turtle pic 1**.

9. Make your own drawing!
 - Return to the code. Change **angle** variable to 15°.
 - Add a key (c) that changes the color by 10 (in Pen extension).
 - Restart by hitting the green flag. (Go.)
 - Control the turtle to make a drawing, changing colors as you go.
 - Be sure to **include branching** by using e and q!
10. **Submit** a screenshot of your drawing **on Canvas** under assignment **Scratch: L-sys Turtle pic 2**.